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contact, without seeing any indication whatever of the black drop; and at 1^h 42^m 8^s·59 I saw the last contact; but owing to the passing clouds, there may be an uncertainty of, say, one second in first and about two seconds in last contact at Egress. Time by chronometer compared before and after transit with ticks from Sydney clock."

Observed Times of Transit of Mercury in New South Wales.

	First External Contact.			First Internal Contact.			Second Internal Contact.			Second External Contact.		
	h	m	s	h	m	s	h	m	s	h	m	s
Russell	8	21	44·64	8	23	39·14	1	40	26·65	1	42	8·95
Lenehan		22	8·00			43·00			29·25			4·25
Wright		21	20·00			10·00			23·00			3·00
Morrice		22	15·00			46·00			16·00			16·00
Hargrave		22	0·66			41·38			10·40			0·09
Bladen		22	3·34			42·84			44·34			23·64
Conder		22	5·00			35·75			—			—
Brooks		22	3·60			36·45			26·48			8·59
Arithmetical Means	8	21	57·53	8	23	36·82	1	40	25·16	1	42	9·217

Observations of the Transit of Mercury, 1881, *November* 7, *made at Honolulu, Sandwich Islands.* By C. H. Rockwell, Esq.

(*Communicated by the Secretaries.*)

I send herewith a Report of my movements in connection with observations made of the Transit of *Mercury*, at Honolulu, Sandwich Islands, on November 7, 1881.

The king, Kalakaua, offered me the free occupancy of the site from which the observations of the Transit of *Venus* were made in December 1874 by the English party under command of Capt. G. L. Tupman.

This civility on the part of His Majesty saved me the trouble and expense of building a pier of mason-work on which to mount my telescope, and, being on his own private grounds, I was enabled to occupy a quiet location whose geographical position had been determined with great accuracy.

The latitude and longitude given in this Report, and used in computing the times of contact, are the results obtained by Capt. Tupman.

I built a shed of rough boards over one of the piers left by the Transit of *Venus* party; there was no roof on the slope towards the South and West, the opening being covered at night with a part of an old sail, which could be easily put in position or withdrawn.

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I set up the telescope in this temporary observatory on November 4, and during the 5th and 6th brought the instrument into proper adjustment.

The morning of the 7th was cloudy, and the prospects of success not very encouraging. The clouds passed away from the zenith, however, before the time of first contact, which was about 11.45 A.M., local mean time.

Astronomically speaking, the day was not perfect, nor even first-rate; still it was very good indeed, and I consider my work, on the whole, as having been highly successful.

In making my observations I used the full aperture of the glass, 6⅓ inches, with a first surface solar prism, by Alvan Clark & Sons, and an eyepiece of power 60.

Twice during the day I used a power of 130, but for a few minutes only, as I found the increased size of the image was gained at the sacrifice of clearness of definition.

The intensely black disk of the planet was in strong contrast with a Sun-spot of considerable size, which was seen on the face of the Sun quite near to the point of second contact.

After having recorded the time of first and second contact, the telescope was moved in R. A. a little in advance of the Sun, and there clamped.

The time was then taken from the chronometer, when the advancing limb of the Sun, a large Sun-spot, the planet *Mercury*, and the following limb crossed the centre wire of the eyepiece: this being set at 90° to the line of the Sun's motion in the parallel, by allowing the Sun's limb to move along it.

I took about ninety of these combined observations, a copy of the record being appended to this Report.

At times during the continuance of the Transit the sky was free from clouds in the vicinity of the Sun, and the definition very satisfactory.

The spherical form of the planet was easily noticed; the edges of his disk sharp and clean, without any *fuzziness* or wavy outline to indicate the existence of an atmosphere.

I took advantage of these favourable moments to look carefully over the whole disk of the Sun, searching for anything which might look like an intra-Mercurial planet. I failed, however, to detect any such indications, although, from the clearness with which the *rice-grains* were shown, I am confident I could have detected the presence of any opaque body having one-tenth the diameter of *Mercury*. Nor did I at any time see any spots on the disk of the planet.

At the time of third and fourth contacts the Sun was only about twenty minutes above the horizon.

I could still see the planet distinctly, but the haze lying along the horizon caused a violent *boiling* of the edges of the Sun's disk, and the planet seemed to be dancing, or tossed about like a chip floating on the surface of broken water.

Three times I called to the recorder to *mark* the instant of

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third contact, supposing the planet to have reached the edge of the disk; again and then again I saw a strip of light in advance of the moving body, each time calling to *mark*.

The unfavourable atmospheric conditions at this phase would allow but little weight to be given to an opinion as to the existence of the *black-drop* phenomenon. I can say, however, quite positively, that no such appearance presented itself to me.

The whole disk of the planet seemed to be thrown towards the edge of the Sun, and then to rebound; but the advance and receding were well defined.

The form of the disk was distorted, but the edges were clean and sharp up to the moment when third contact was last called.

I attach but little value to the time given as fourth contact, it simply records the last glimpse which I had of the Transit of November 1881.

I give the computed and observed times of contacts below:—

Contacts.	Computed *Nautical Almanac.*	Computed *American Ephem.*	Observed G.M.T.
1st	10 16 29·79	10 16 23·01	10 17 27·25
2nd	10 18 12·62	10 18 05·84	10 18 25·75
3rd	15 35 21·77	15 34 39·66	15 35 36·25
4th	15 37 04·79	15 36 22·68	15 36 28·25

Transit of Mercury at Honolulu.

Lat. 21° 17′ 56″·3 North; Long. 10^{h} 31^{m} 27·3 West of Greenwich.

Chronometer: Negus, No. 1305. Correction + 38^{s}·25.

First contact 10 16 49 by Chronometer.

Second contact 10 17 47·5 „

Sun's Advancing Limb.	Sun-spot.	Diff.	*Mercury* (centre)	Diff.	Sun's Following Limb.	Diff.
h m s	h m s	m s	h m s	m s	h m s	m s
10 19 58·5			10 21 56	1 57·5	10 22 12	2 13·5
22 59	10 24 12	1 13	24 56	57	25 14·5	15·5
26 44·5	27 57·5	13	28 39·5	55	28 59·5	15
29 38	30 51	13	31 31·5	53·5	31 52·5	14·5
32 23·5	33 37	13·5	34 17	53·5	34 39	15·5
35 00·5	36 13·5	13	36 53	52·5	37 15·5	15
37 45	38 57·5	12·5	39 35·5	50·5	39 59·5	14·5
40 22	41 34	12	42 11	49	42 36	14
42 49·5	44 01·5	12	44 38	48·5	45 04	14·5
45 31·5	46 44	12·5	47 20·5	49	47 46·5	15

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Sun's Advancing Limb.	Sun-spot.	Diff.	*Mercury* (centre)	Diff.	Sun's Following Limb.	Diff.
h m s	h m s	m s	h m s	m s	h m s	m s
Passing clouds.						
11 05 29·5	11 06 42·5	1 13	11 07 10·5	1 41	11 07 44·5	2 15
08 16	09 29	13	09 56	40	10 31·5	15·5
10 52	12 05	13	12 31	39	13 07	15
13 37	14 49	12	15 15	38	15 52	15
16 15	17 28	13	17 52·5	37·5	18 31	16
18 52	20 04·5	12·5	20 28	36	21 07	15
21 28	22 40	12	23 03	35	23 43	15
24 12	25 24	12	25 46	34	26 27	15
26 40·5	27 53·5	13	28 14	33·5	28 57·5	17
29 20	30 32	12	30 52·5	32·5	31 35·5	15·5
38 18	39 30	12	39 47·5	29·5	40 33	15
41 14·5	42 25·5	11	42 43	29	43 29	14·5
44 40	45 52	12	46 08	28	46 55	15
47 18	48 29·5	11·5	48 44·5	26·5	49 32·5	14·5
50 43	51 54·5	11·5	52 08	25	52 58	15
53 29	54 40	11	54 52·5	23·5	55 43·5	14·5
56 24·5	57 36	11·5	57 47	22·5	58 39·5	15
59 07	12 00 18·5	11·5	12 00 29	22	12 01 22	15
12 02 12·5	03 24	11·5	03 33·5	21	04 27·5	15
04 54·5	06 06	11·5	06 14	19·5	07 09	14·5
07 45			09 04	19		
11 09·5	12 19·5	10	12 26	16·5	13 23	13·5
14 05	15 17	12	15 22·5	17·5	16 20·5	15·5
17 11	18 22	11	18 26	15	19 25·5	14·5
19 52	21 03	11	21 06	14	22 06·5	14·5
22 27	23 38	11	23 40	13	24 42	15
25 13·5	26 25	11·5	26 26	12·5	27 28·5	15
28 00	29 11	11	29 11	11	30 15	15

Mercury passes the Sun-spot.

Sun's Advancing Limb.	*Mercury* (centre)	Diff.	Sun-spot.	Diff.	Sun's Following Limb.	Diff.
h m s	h m s	m s	h m s	m s	h m s	m s
12 37 19	12 38 26·5	1 07·5	12 38 29·5	1 10·5	12 39 34	2 15
39 53·5	41 00·5	07	41 05	11·5	42 09	15·5
42 24·5	43 30	05·5	43 35·5	11	44 39	14·5

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Sun's Advancing Limb.	*Mercury* (centre)	Diff.	Sun-spot.	Diff.	Sun's Following Limb.	Diff.
h m s	h m s	m s	h m s	m s	h m s	m s
12 45 08·5	12 46 14	1 05·5	12 46 20	1 11·5	12 47 24	2 15·5
49 22	50 25	03	50 33	11	51 37	15
51 56			53 06·5	10·5	54 11	15
54 42	55 43·5	01·5	55 53·5	11·5	56 57·5	15·5
57 14	58 14	00	58 25	11	59 29	15
59 48	1 00 47·5	0 59·5	1 00 59	11	1 02 03·5	15·5
1 02 38·5	03 37	58·5	03 49·5	11	04 54·5	16
05 30	06 27	57	06 40·5	10·5	07 45	15
08 06·5	09 03·5	57	09 17·5	11	10 21·5	15
11 11	12 06	55	12 12	11	13 26	15
14 12·5	15 06	53·5	15 23	10·5	16 27	14·5
16 57	17 49·5	52·5	18 07·5	10·5	19 12	15
19 43·5	20 35	51·5	20 54·5	11	21 58	14·5
22 57·5	23 48	50·5	24 08·5	11	25 12·5	15
25 47	26 37·5	50·5	26 58	11	28 02·5	15·5
28 43	29 31·5	48·5	29 53·5	10·5	30 58	15
31 45	32 33	48	32 56	11	34 00·5	15·5
35 30·5	36 17	46·5	36 41·5	11		
39 48·5						
40 14·5	40 58·5	44	41 25	10·5	42 30	15·5
42 42·5	43 26·5	43·5	43 54	11·5	44 58·5	16
45 42	46 23·5	41·5			47 56	14
48 43			Passing clouds.			
2 01 05	2 01 41	36				
15 44	16 13	29	2 16 52	08		
18 43	19 12	29	19 52·5	09 5	2 20 57·5	14·5
22 42·5	23 11	28·5	23 51·5	10	24 56·5	14
25 21	25 48	27	26 30	09	27 36	15
28 26·5	28 52·5	26	29 36	09·5	30 41·5	15
31 01·5	31 27	25·5	32 11·5	10	33 16·5	15
33 31	33 55	24	34 40·5	09·5	35 45 5	14·5
36 30	36 53·5	23·5	37 40·5	10	38 45·5	15·5
39 27	39 49	22	40 36·5	09·5	41 42·5	15·5
42 04	42 24·5	20·5	43 14	10	44 19	15
45 06	45 26	20	46 16	10	47 21	15
47 42·5	48 01	18·5	48 51·5	09	49 57·5	15
50 13	50 31	18	51 23	10	52 29	16

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Sun's Advancing Limb.	*Mercury* (centre)	Diff.	Sun-spot.	Diff.	Sun's Following Limb.	Diff.
h m s	h m s	m s	h m s	m s	h m s	m s
2 52 46	2 53 03	0 17	2 53 55	1 09	2 55 01	2 15
55 40·5	55 56·5	16	56 50	09·5	57 56	15·5
58 29			59 38	09	3 00 44	15
3 01 01·5	3 01 15	13·5	3 02 10·5	09	03 16	14·5
04 00·5	04 13	12·5	05 10	09·5	06 16	15·5
07 08·5	07 19·5	11	08 17·5	09	09 23·5	15
10 00	10 10	10	11 09	09	12 14·5	14·5
12 58·5	13 07	08·5	14 08	09·5	15 13·5	15
15 36	15 44	08	16 45	09	17 51	15
18 14	18 21	07	19 23	09	20 29	15
21 00	21 06	06	22 09·5	09·5	23 15·5	15·5
24 03	24 08	05	25 11·5	08·5	26 17·5	14·5

Third contact 3 34 58 by Chronometer.
Fourth contact 3 35 50 „

Tarrytown, New York:
1881, *December.*

Notes on the Lunar Eclipse, 1881, *December* 5.
By J. Rand Capron, Esq.

Though the Moon rose eclipsed at $3^h\ 50^m\ 0^s$ G. M. T. it was, owing to slight banks of clouds on the horizon, not until $5^h\ 3^m$ that it was seen from this locality. At that time it presented an interesting aspect, a small portion only being left uncovered. The opposite side of the disk to this glowed with a distinct, but not deep, red tint. This gradually melted into a golden tint, and finally into a pearly grey as it approached the bright part of the Moon. The uncovered part gradually got narrower, and at $5^h\ 10^m$ ($5^h\ 8^m\ 0^s$ at Greenwich) was considered to be at its narrowest. No red patches or brilliant tints were seen, but the Moon's configuration was well made out through the shadow. In the 3¼-inch Cooke, power 50, the general appearance of the tinted globe, with its faint edging of partial light, was very charming. As the shadow passed off, the red tint was gradually lost, until when about two-thirds of the disk were uncovered it was not longer recognisable.

Throughout the eclipse it was noticed that the lighted portion of the Moon was very much softened into the obscured part without definite outline; and also that there was difficulty in distinguishing any boundary between the umbra and the pen-